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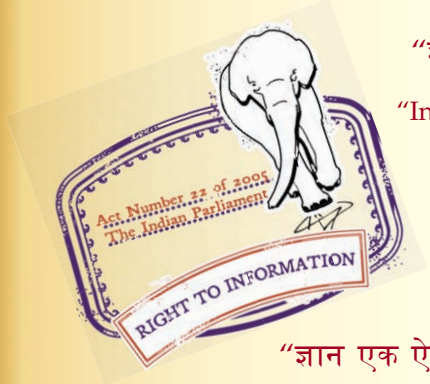

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IS : 1121 (Part I) - 1974
(Reaffirmed 2008)
Edition 2.1
(2008-09)

Indian Standard

METHODS OF TEST FOR DETERMINATION OF STRENGTH PROPERTIES OF NATURAL BUILDING STONES

PART I COMPRESSIVE STRENGTH

(First Revision)

(Incorporating Amendment No.1)

UDC 691.21:620.173

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

Price Group 2

Indian Standard

METHODS OF TEST FOR DETERMINATION OF STRENGTH PROPERTIES OF NATURAL BUILDING STONES

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AMENDMENT NO. 1 SEPTEMBER 1980

TO

IS:1121(Part I)-1974 METHODS OF TEST FOR DETERMINATION OF STRENGTH PROPERTIES OF NATURAL BUILDING STONES

PART I COMPRESSIVE STRENGTH

(First Revision)

Alteration

(*Page 4, clause 3.1*) - Substitute the following for the existing clause:

'3.1 Test pieces shall be made from samples selected in accordance with 2 and shall be in the form of cubes or cylinders. They shall be cut or drilled from the samples. The diameter or lateral dimension (distance between opposite vertical faces) of a test piece shall not be less than 50 mm and the ratio of height to diameter or lateral dimension shall not be less than 1:1 (*see also* 6.2).'

(BDC 6)

Reprography Unit, BIS, New Delhi, India

Indian Standard

METHODS OF TEST FOR DETERMINATION OF STRENGTH PROPERTIES OF NATURAL BUILDING STONES

PART I COMPRESSIVE STRENGTH

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part I) (First Revision) was adopted by the Indian Standards Institution on 1 October 1974, after the draft finalized by the Stones Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Building stones are available in large quantity in various parts of the country and to choose and utilize them for their satisfactory performance, it is necessary to know the various strength properties determined according to standard procedure. This standard has, therefore, been formulated to cover the standard method for determining the strength properties of various stones. This standard covering compressive, transverse and shear strength properties of building stones was published in 1957 and is being revised based on the actual use of it in the past 17 years and the experience gained in testing of building stones for these properties in the various research laboratories of this country. In this revision, property of tensile strength has also been added, which is also important for assessing the suitability of stone.

0.2.1 This standard is now being issued in four parts, each part covering a specific property to facilitate the use of this standard. Part I covers the determination of compressive strength of natural building stones.

0.3 This edition 2.1 incorporates Amendment No. 1 (September 1980). Side bar indicates modification of the text as the result of incorporation of the amendment.

0.4 In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard (Part I) lays down the procedure for the determination of compressive strength of natural building stones used for constructional purposes.

*Rules for rounding off numerical values (*revised*).

2. SELECTION OF SAMPLES

2.1 The sample shall be selected to represent a true average of the type or grade of stone under consideration.

2.2 The sample shall be selected from the quarried stone or taken from the natural rock, as described in **2.2.1** and **2.2.2** and shall be of adequate size to permit the preparation of the requisite number of test pieces.

2.2.1 *Stones from Ledges or Quarries* — The ledge or quarry face of the stone shall be inspected to determine any variation in different strata. Differences in colour, texture and structure shall be observed. Separate samples of stone weighing at least 25 kg each of the unweathered specimens shall be obtained from all strata that appear to vary in colour, texture and structure. Pieces that have been damaged by blasting, driving wedges, heating, etc, shall not be included in the sample.

2.2.2 *Field Stone and Boulders* — A detailed inspection of the stone and boulders over the area shall be made where the supply is to be obtained. The different kinds of stones and their conditions at various quarry sites shall be recorded. Separate samples for each class of stone that would be considered for use in construction as indicated by visual inspection shall be selected.

3. TEST PIECES AND CONDITIONING

3.1 Test pieces shall be made from samples selected in accordance with **2** and shall be in the form of cubes or cylinders. They shall be cut or drilled from the samples. The diameter or lateral dimension (distance between opposite vertical faces) of a test piece shall not be less than 50 mm and the ratio of height to diameter or lateral dimension shall not be less than 1:1 (*see also* **6.2**).

NOTE — Test pieces prepared out of broken beams in the transverse test [*see* IS : 1121 (Part II)-1974*] may also be used.

3.1.2 The load-bearing surfaces shall be finished to as nearly true, parallel and perpendicular planes as possible by using rock cutting saws, grinding polishing wheels or abrasive powder. The dimensions of the faces under loading shall be measured to the nearest 0.2 mm.

3.1.3 The load-bearing surfaces and the direction of the rift shall be carefully marked on each test piece after finishing.

3.1.4 Three test pieces shall be used for conducting the test in each of the conditions mentioned in **3.1.4.1** and **3.1.4.2**. In each of these conditions, separate tests shall be made for the specimen when the load is parallel to the rift and perpendicular to the rift. In all twelve test pieces shall be used.

*Methods of test for determination of strength properties of natural building stones: Part II Transverse strength (*first revision*).

3.1.4.1 The test pieces shall be immersed in water maintained at 20 to 30°C for 72 h before testing and shall be tested in saturated condition.

3.1.4.2 The test pieces shall also be tested in a dry condition and shall be dried in an oven at 105 ± 5°C for 24 h and cooled in a desiccator to room temperature (20 to 30°C).

4. APPARATUS

4.1 A testing machine of sufficient capacity for the tests and capable of applying load at the specified rate shall be used. The machine shall be equipped with two steel bearing plates with hardened faces. One of the plates (preferably the one that normally bears on the upper surface of the test pieces) shall be fitted with a ball seating in the form of a portion of a sphere, the centre of which coincides with the central point of the face of the plate. The other compression plate shall be plain rigid bearing block. The bearing faces of both plates shall be preferably larger than the nominal size of the test piece to which the load is applied. The bearing surface of the plates when new, shall not depart from a plane by more than 0.012 5 mm at any point. The movable portion of spherically seated compression plate shall be held on the spherical seat, but the design shall be such that it is possible to rotate the bearing face freely and tilt it through small angles in any direction.

5. PROCEDURE

5.1 The load shall be applied without shock and increased continuously at a rate of approximately 140 kg/cm^2 of the area per minute until the resistance of the test piece to the increasing load breaks down and no greater load is sustained. The maximum load applied to the test piece shall be recorded and the appearance of the stone and any unusual features in the type of failure shall be noted.

6. EVALUATION AND REPORT OF TEST RESULTS

6.1 The maximum load in kg supported by the test piece before failure occurs, divided by the area of the bearing face of the specimen in cm^2 shall be taken as the compressive strength of the specimen.

6.2 When the ratio of height to diameter (or lateral dimension) differs from unity by 25 percent or more, the result shall be calculated to that standard test piece as follows :

$$C_c = \frac{C_p}{0.778 + 0.222\ (\ b + h\ )}$$

where

C_c = compressive strength of standard test piece,
C_p = compressive strength of the specimen having a height greater than the diameter or lateral dimension,
b = diameter or lateral dimension, and
h = height.

6.3 The average of the three results in each condition separately (*see* **3.1.4**) shall be taken for purposes of reporting the compressive strength of the sample.

6.4 The compressive strength shall be expressed in kg/cm^2.

6.5 Identification of the sample, date, when sample was taken and type of stone shall be reported.

6.6 Size and shape of test pieces used in the tests shall be indicated.

6.7 A description of the way in which the test pieces were prepared shall be included.

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This Indian Standard has been developed by Technical Committee : BDC 6

Amendments Issued Since Publication

Amend No.	Date of Issue
Amd. No. 1	September 1980

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